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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

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PHILOSOPHY

Original Antigenic Sin

"ORIGINAL ANTIGENIC SIN" was seen as a cause of and clue to vaccination against influenza epidemics.

The type of virus causing the initial influenza plays a "dominant role" in later immunity to the disease, Dr. Thomas Francis Jr. told the American Philosophical Society meeting in Philadelphia.

The professor of epidemiology at the University of Michigan School of Public Health and Medical School said he had formulated the "doctrine of original antigenic sin" after measuring immune substances, or antibodies, in the blood of persons of different ages against different strains of Type A influenza virus.

He found that the most prominent antibody of an age group seemed to be related to the family of virus that had been prevalent at the time of childhood. Therefore, Dr. Francis concluded, the first infection during life conditioned later immunity.

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Industrial Socialism

The internal economics and politics of giants of American industry show features of "private socialism," or the "welfare state," Dr. Wilbert E. Moore, sociology professor at Princeton University, said. He reported that there is ample evidence of deliberate cultivation of "pure collectivism" within such corporations, even though the pressure for conforming conduct has been exaggerated by critics.

Dr. Moore said that "loyal identification with the company, patriotic acceptance of its 'party line,' the periodic attempts to minimize differences in rank and function through educational and recreational 'mixers,' and appeals to such metaphors as 'family' and 'team'" all show an earnest attempt by giant business corporations to secure unity in the face of competitors, the Government or the public at large.

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Past Is Basis for Future

All past experience is a basis for possible future action, Dr. Hadley Cantril of the Institute for International Social Research, Princeton, N. J., told the meeting. He said that in the course of living "each of us thus builds up his own reality world to attain as high a degree of correspondence as he can between what he perceives and what he experiences after he acts according to his perceptions."

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Explain Superconductors

The remarkable flow properties of liquid helium at temperatures near absolute zero, or 459.7 degrees below zero Fahrenheit, and of electrons in superconductors can be explained in terms of the quantum theory, Dr. John Bardeen, Nobelist in physics of the University of Illinois, said. At absolute zero, superconductors and superfluid helium may be regarded as a single quantum state extending throughout the system, with long-range correlation of the average momentum of the particles.

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Higher Education in U.S.

A "CONSPIRACY of silence" covers the fact that college degrees granted in the United States are based on a "vast range" of standards, Dr. James Bryant Conant, president emeritus of Harvard University, told the meeting.

He said this difference in standards was a "consequence of the American doctrine of equality of status" and that he did not condemn or discredit it. However, Dr. Conant emphasized, the existence of a range of standards for college degrees makes suggestions to raise entrance requirements over the entire nation "ridiculous."

Although the United States has never had the equivalent of European state examinations for determining university study ability and probably never will have, Dr. Conant urged that professional schools of law and medicine and graduate schools of arts and science require their candidates to pass a set of examinations.

These examinations should demonstrate that applicants have a "good reading, writing, and speaking knowledge of at least one modern foreign language; a knowledge of mathematics through the calculus; a knowledge of physics, chemistry and biology at the freshman college level; the ability to write a competent essay; a knowledge of American history and political institutions at a sophisticated level; and a knowledge of English and American literature at a corresponding level."

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ICHTHYOLOGY

Shark With 114 Embryos Is "Obstetrical" Marvel

"A MARVEL in fish obstetrics" has been brought to light in the world-wide census of shark attacks now being conducted under the auspices of the Smithsonian Institution.

A pregnant shark containing 114 embryos, each about 10 inches long, was found off the Hawaiian Islands. The total mass of embryos amounted to about five gallons, probably a record for the fish race, Dr. Leonard P. Schultz, Smithsonian curator of fishes, reported.

The shark belonged to a species of the bramble shark, with a body covered with short, sharp spines. About 10 feet long, it is not really dangerous and dwells on the bottom in deep water, seldom coming near enough to the surface to molest humans.

As far as is known, the species is not especially numerous despite the apparently enormous birth rate. Infant mortality among the defenseless offspring may be assumed to be equally enormous in the dark depths of the natural habitat.

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ASTROPHYSICS

Tame H-Bomb Reaction

MAN-MADE satellites probing space within the solar system may glean information leading to new ideas for the control of fiery H-bomb reactions.

This could be one result of the inner solar system's having become a "vast laboratory," Dr. John A. Simpson of the University of Chicago reported. One of today's major problems in physics, he said, is discovering how electromagnetic fields originate in stars and space and speed up particles to such high energies that auroras, cosmic rays and other effects result.

In a report on solar system physics by the National Academy of Sciences' Space Science Board in Washington, D. C., Dr. Simpson said this problem is already under investigation with satellites and space probes. The report, "Physics of Fields and Energetic Particles in Space," is one of nine chapters in the Academy's survey of "Science in Space."

Energetic particles are believed to exist throughout the universe, so that understanding of their behavior within the solar system should also lead to knowledge of such questions as how galaxies developed. In the solar system, the sun, a star shining by its own light, is a fundamental energy source for generation of magnetic fields and acceleration of particles. The method by which the sun's energy is transferred is not yet understood.

However, its extreme brightness is more a consequence of its large mass than the fact the sun is burning up its substance, by turning hydrogen into helium. If a comparable mass of living, breathing humans composed the sun, they would generate 5,000 times as much heat as the sun, Dr. E. N. Parker, also of the University of Chicago, reported.

He described the "solar wind" as a stream of gas flowing continuously from the sun at 300 miles a second and carrying with it a solar magnetic field. Solar winds may account for auroras and magnetic storms in the earth's atmosphere, he said.

Dr. James A. Van Allen of the State University of Iowa reported on the present knowledge of trapped radiation in the the earth's magnetic field. He believes this radiation is concentrated in two large belts around the earth. Mars and Venus, but not the moon, may also have such trapped radiation, he said.

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ASTRONOMY—PSYCHOLOGY

Mars Gases Exclude Life

Martian life is highly unlikely due to poisonous gases. Intelligence may have 120 facets, and taste sensations have been measured.

LIFE of any kind on Mars is highly unlikely because the Martian atmosphere contains poisonous gases, three scientists reported to the National Academy of Sciences meeting in Washington, D. C.

The poisonous compounds are oxides of nitrogen, one cause of earthly—and also noxious—smog. Drs. C. C. Kiess, C. H. Corliss and Harriet K. Kiess of the National Geographic Society and the National Bureau of Standards said their theory about the reactions of nitrogen oxides could explain many observed Martian phenomena.

The polar caps, the doctors Kiess had reported to astronomers, are due to chalky white deposits of nitrogen tetroxide. Their yellowish tint is due to nitrogen dioxide in equilibrium with the solid nitrogen tetroxide. Absorption by nitrogen peroxide explains the low reflecting ability of Mars in green, blue and violet light.

The dark belt bordering the melting polar caps is believed liquid nitrogen tetroxide with other nitrogen compounds in solution or could be due to wetting of the Martian surface. The spread of heavy, gaseous nitrogen tetroxide over the dark areas, toward the equator, accounts for the seasonal change of color shown by them.

In the Martian atmosphere, nitrogen oxides may exist in both gaseous and solid phases, and, in these forms, account for observed meteorological changes, the scientists said. As tiny crystals, at the temperatures prevailing at various altitudes and latitudes, they could cause the haze and blue and white clouds known to occur.

The infrequent blue clearing is believed due to a shift in equilibrium from nitrogen dioxide to nitrogen tetroxide, owing to a cold wave. During a heat wave, the shift would be toward higher concentration of nitrogen dioxide, thus accounting for the yellow clouds that, at times, are planet-wide.

If this view of Mars is correct, the planet can be considered as a gigantic photochemical nitrogen fixation plant. The known toxic effects of nitrogen oxides "argue against existence of living organisms" on Mars, they concluded.

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Predicts Mental Abilities

MANY FACETS, or abilities, of human intelligence are still to be discovered, Dr. J. P. Guilford, University of Southern California psychologist reported at the meeting.

Scientists have known for some years that intelligence is not just a single talent, but as many as 55.

The total, Dr. Guilford forecast, may eventually be found to be 120 or more.

Knowledge of the new factors will increase the possibility of understanding and measuring such talents as creative thinking and judgment.

Education, Dr. Guilford predicted, may again emphasize "training the mind" rather than instruction in skills.

Dr. Guilford made his predictions on the basis of the basis of the construction of a mathematical "model" of mental abilities.

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Measure Taste Strength

TUNING in on the nerve in the tongues of animals and in the brain centers governing taste, scientists have obtained a measure of the strength of taste sensation.

This has been found to be in proportion to the behavior consequences of the taste, Dr. Carl Pfaffmann of Brown University, Providence, R. I., told the meeting. A rat will learn to run toward a reward of sugar, for example. The sweeter the solution he is rewarded with and the more intense his taste, the stronger will be his impulse to run toward it.

If the rat is given a substance which tastes bad to him, it will have the opposite effect on the animal—he will run away from it. But still the strength of his tendency to run is in proportion to the strength of the taste sensation as measured electrically from the nerves.

In some cases there is a duplex effect on behavior; the rat will run toward a weak solution, but will run away from a strong solution. With some substances, a little is good but too much is repellent.

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TAILOR-MADE GLASS—Beakers, flasks and tubes are made to order for Parke, Davis & Company research chemists by glass blower Harry Rietman who also repairs apparatus broken during experiments.

AGRICULTURE

Use of Lime, Fertilizer Crowds Out Red Sorrel

THE WEEDS in your lawn can be crowdeded out by making the grass grow thicker.

A dense, healthy turf is a good defense against sheep sorrel and other weeds, Dr. Felix V. Juska of the U.S. Department of Agriculture, Beltsville, Md., told the Weed Society of America meeting in Denver, Colo.

Sheep sorrel, a serious lawn and turf weed throughout the Northeast and Midwest during the warm months, grows six to 15 inches high. It has a slender stem with green or red flowers in clusters two to ten inches long. Often called red sorrel, it is difficult to control with herbicides alone.

Working with a thin turf of common Kentucky bluegrass and red fescue heavily infested with sheep sorrel, Dr. Juska found that applying 6,000 pounds of lime per acre, along with fertilizer in the spring and fall of each year, drastically reduced the sorrel.

This was because the resulting dense turf crowded out the weed, he said. The weed will not compete with desirable grasses in soils of high fertility and low acidity.

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SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

Nutrimentos.—Experimentatores del statounitese Departimento de Agricultura a Beltsville, Maryland, ha succedite a isolar in forma de pulveres le substantias que imparti a carne le aroma e gusto (1) de carne in general e (2) de porco, bove, etc. in particular. Le aroma "carnesc" se trova principalmente in carne magre, le aroma "porcin" etc. in le partes grasse. On pensa usar tal pulveres pro render algas—le major nutrimento (nunc concipibile) pro le astronauta futur—si non deliciose al minus passabilemente appetibile.

Astrophysica.—Observationes colligite per le ballonistas statounitese, qui—in novembre 1959—ascendeva a un altitude de circa 25 km, supporta le non-previdite conclusion que le atmosphera de Venere contine un concentration de vapor de aqua equal a illo incontrate supra le plus alte nubes terrestre e ergo adequate pro mantener le un o le altere forma de vita organic.

Physica Atomic.—In le glacies eterne del nord de Groenlandia, Danmark e le Statos Unite ha preparate le installation de un "portabile" reactor nuclear como fonte de energia e de calor pro un station de recerca scientific e de vigilantia militar.

Construction.—Un triste (e un pauco comic) aspecto del statounitese exposition a Moscova in 1959 esseva le facto que le beton del pavimento in le halla principal se pulverisava sub le pedes del milles e milles de visitantes russe. Isto esseva, pro exprimer lo conservatorimente, satis embarassante. In Osaka in Japon, al veniente exposition international de commercio, le pavimento del halla american essera revestite de resinas e altere reinfortiantes. On etiam spera que il es correcte supponer que pedes japonese es plus leve que pedes russe.

Invenenamento Chimic.—In juveniles de minus que cinque annos de etate, le statistica statounitese revela un mortalitate annual per invenenamento chimic accidental de plus que 400 casos. In 1959, in le citate de New York, venenos chimic occideva plus juveniles del etates mentionate que diphtheria, poliomyelitis, e infectiones streptococcal insimul.

Foresteria.—In 1959, plus que duo milliardos arbores esseva plantate in le Statos Unite, i.e. circa un tertio plus que le anno precedente. Iste benvenite facto es probabilemente un del effectos del varie programmas instituite pro reducer le hectarage que le fermeros dedica a plantas de recolta annual.

Astronautica.—Le perigeo del satellite american, Vanguard I, manifesta un discrepantia inter valor calculate e valor observate que non se explica per irregularitates in le conformation del terra o per le gravitation solar, terrestre, o lunar. Calculationes del pression exercite per le radiation solar pare indicar que ecce le factor a incriminar.

Automobilismo.—Secundo le psychiatro, Dr. J. J. Conger del Universitate Colorado, le "tempore de reaction" del automobilista, su intelligentia, su "perception in profundor," e simile factores traditionalmente considerate como importante pro differentiar inter le automobilista qui es digne de confidentia e su collega del typo contrari es multo minus significative in le causation e prevention de accidentes que le stato emotional del homine al volante. Accidentes es plus frequente (secundo Dr. Conger) quando le conductor del automobile es irritate, deprimite, tense, o mesmo inusualmente gaudiose.

Drogas.—Pro resolver definitivemente le ancian controversia de si o non aspirina causa ulceres peptic, duo medicos de Edinburgh in Scotia ha studiate 244 patientes con arthritis rheumatoide durante sex annos de "aspirinisation" satis regular e massive, con le constatation final que le incidentia de ulceres peptic in iste gruppo non differeva significativemente ab illo in le population general.

Materiales.—In le laboratorios del compania General Electric, il esseva constatate que un certe cauchu siliconic deveni plus forte e acquire etiam altere qualitates desirabile quando illo es irradiate in stato de extension extreme. Irradiation sin extension affice le cauchu differente e minus favorabilemente.

Ressources Mineral.—Secundo le plus recente statisticas, coperiente le anno 1959, le Statos Unite ha reservas cognoscite de petroleo in sito amontante a circa 50 milliones megalitros, i.e. circa 2 milliones megalitros plus que lo que esseva indicate in le estimationes pro le anno precedente.

Botanica.—Rotation circum le axe vertical affice plantas differentemente secundo que illo es dextrorse o sinistrorse. Isto esseva constatate per Dr. R. L. Jones de Nove Zelanda qui laborava con cyclaminos, fabas, e avena e trovava que omne iste tres species es sinistrophile (e ergo dexterophobe) a judicar per le intensitate de lor crescentia sub le conditiones de un rotation de 360 grados per die.

Communicationes.—Pro provider "le plus compacte forma de communication practicabile in le presente situation linguistic", le Journal del Association Medical American ha comenciate publicar summarios in interlingua con omne su articulos original. Le JAMA es un septimanal. Su edition de circa 200,000 exemplares rende lo le plus legite jornal medical del mundo. Le preparation del textos in interlingua es le responsabilitate de Dr. Frederic T. Jung, Redactor Assistente del Jornal.

Recercas de Cancere.—"Psychologicamente insalubre" esseva le termino usate per Dr. E. V. Cowdry del Universitate Washington (a Saint Louis, Missouri) pro characterisar le frequente prediction que le solution del problema del curation de cancere es imminente. In un conferentia pro jornalistas, Dr. Cowdry sublineava le facto que il existe multe differente canceres e que le probabilitate es minimissime que curas va esser trovate pro omnes. Secundo Dr. Cowdry le plus urgente desiderato immediate in le campo del recercas cancerologic es le studio del comportamento biochimic e biophysic del cellula cancerose individual e de su fato in le gruppo de cellulas que constitue lo que nos appella un tumor maligne.

Bibliophilia.—Circum 1980, quasi 40 pro cento del supponitemente durabile libros producite durante le prime medietate de nostre seculo va esser physicamente disintegrate, a judicar per tests con 500 specimens effectuate al Bibliotheca Statal de Virginia. Le pauco satisfacente comportamento del papiro de ille libros sub le stress de apparatos tiratori e plicatori mechanic es probabilemente explicabile per le presentia in illo de tracias del acido usate in converter ligno in pulpa.

Astronautica.—Un involeppe de helium es possibilemente le solution del problema de calor frictional in le re-entrata de astronaves in le atmosphera terestre. Ejicite al puncta del naso del nave, le helium esserea automaticamente distribuite in un tenue e uniforme strato al superficie de illo e absorberea un grande portion del calor generate per le undas de choc ante que illo se perderea in le ambiente.

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Reading Interlingua

YOU CAN READ Interlingua if you had no more than one semester of high school French or Spanish or Latin and flunked it. You can read and understand a great deal of it even if you never had contact with any foreign language.

Send this page to an acquaintance abroad and tell him that he can get additional information about Interlingua from Alexander Gode, SCIENCE SERVICE's Interlingua Division, 80 E. 11th St., New York 3, N. Y.

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GENETICS

Heredity's Secret Studied

See Front Cover

SCIENTISTS may gain new insight into the chemical secrets of heredity as a result of a new technique for studying DNA, the substance that controls vital activities in all living cells.

The technique, developed at Harvard University, involves "unzipping" the two-stranded DNA molecule in solution in such a way that it may be reassembled without destroying its biological activity.

DNA (deoxyribonucleic acid) is found in the nuclei of cells and acts as a blueprint for making enzymes and other proteins. When a cell divides, this "chemical of heredity" is duplicated so that both new cells receive a complete set of "instructions."

The DNA molecule is composed of two long strands of atoms twisted together into a helix, like a spiral staircase. Between the two strands, like steps in the staircase, are hundreds of smaller groups called bases, in pairs. Only four kinds of bases are found and their particular arrangement along the DNA molecule is thought to be the code containing the hereditary information.

Harvard scientists, led by Drs. Paul M. Doty and Julius Marmur, have found that, under the right conditions, the DNA molecules in solution can be "unzipped" by heat and reassembled into their typical two-stranded form by cooling the solution slowly. When they cooled the solution rapidly, the molecules remained two separate chains of atoms, they reported in the Proceedings of the National Academy of Sciences, April 1960.

The electron micrographs seen on the cover of this week's SCIENCE NEWS LETTER show, on the left, slowly cooled molecules with the long twisted form of natural DNA, and, on the right, quickly cooled molecules that have lost their thread-like form. The white spheres are bits of polystyrene used as measuring standard.

The researchers have thus been able to build hybrid molecules, using half of the DNA from two different strains of bacteria, that work just as well as natural DNA in the cells of bacteria. They have also "crossed" the hereditary material of two different species in a test tube by building hybrid molecules with DNA elements from two species of bacteria.

In addition, the scientists found evidence that a gene, or unit of heredity remains active even if situated on just one of the two strands.

With this new technique, scientists can put together in the test tube DNA molecules that have never before existed.

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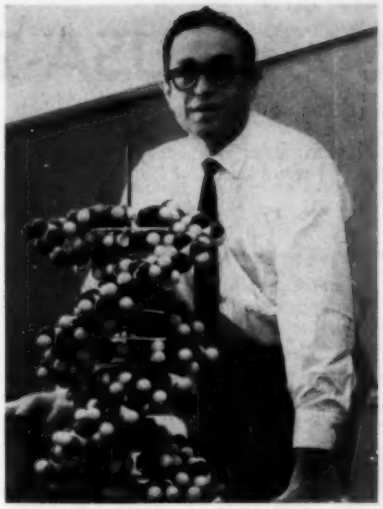

"UNZIPPING" DNA — Drs. Paul M. Doty (left) and Julius Marmur (above) found at Harvard University how to "unzip" the DNA molecule and reassemble it without destroying its biological activity. They will now be able to build entirely new DNA molecules and test their effects in living cells. Dr. Marmur is shown with a model of a part of the DNA molecule.

MEDICINE

More Potent Polio Shots

A POTENT new polio vaccine has proved more effective than Salk shots, clinical tests indicate.

The purified, killed-virus vaccine was tested on four groups of children and produced an immune response to all three types of polio virus in 91% of the cases. Salk vaccine immunized 63% of the children tested.

At a symposium on polio vaccines in Newark, N. J., Dr. Maurice R. Hilleman, of Merck Sharp & Dohme Research Laboratories, West Point, Pa., said that the comparisons are all the more significant because the Salk vaccine selected for the trials was of extraordinarily high potency.

An important problem with Salk vaccine, Dr. Hilleman pointed out, has been the variation in potency of the vaccine from lot to lot. Recent studies have shown that the antibody response to two doses of the ordinary vaccine may be relatively low for Types I and III polio virus.

The best vaccine would be one that could produce immunity to all three strains of polio without fail. The vaccine should do this in one or two doses of small amount, supplemented by a third dose seven months to one year later. These qualifications were set up by Dr. Salk himself.

The new vaccine, purified for greater potency in a smaller dose, contains no detectable monkey kidney tissue (on which the virus is grown). Thus the possibility of damage resulting from multiple injections of kidney antigen is greatly reduced.

Because of the high concentration of the practically pure virus material, the new vaccine can be given in doses of one-half cubic centimeter, compared with one cubic centimeter of the commercial vaccine.

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ARCHAEOLOGY

Excavated Mayan Stela In Style New to Tikal

A CARVED Mayan stone monument of yet unknown dimensions is being uncovered at Tikal in the jungle of northern Guatemala.

A team of University of Pennsylvania Museum archaeologists reported that they have so far dug out 79 inches of the monument which is 30.5 inches wide and 20 inches thick.

The stela, as this type decorated monument is called, bears the Mayan date 9.0.10.0.0. 7 Ahau 3 Yax which is believed to correspond to Oct. 19, 445 A.D. This makes it 1,515 years old.

The decorations so far uncovered include 160 carved hieroglyphs on the back side, preceded by a large one. The right side is decorated with a human figure and other hieroglyphs. The left side and the front of the monument are not excavated yet, and its actual height is still unknown.

The style used on the stela is unusual for Tikal, the ancient Mayan metropolis where it was found. Tikal was one of the important Mayan centers thought to have been inhabited from 1500 B.C. to 900 A.D. when it was abandoned for still unknown reasons.

The stela was found buried below the central temple of the North Acropolis, facing the great plaza of Tikal. A large tomb that will be excavated in the near future has also been found in the same area, the scientists reported.

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ROCKETS AND MISSILES

Space: USA-22; USSR-6

AGAINST Russia's six spectacular bids for world leadership in space exploration, the United States has made more than three times as many successful launchings. Who is ahead? The U.S. satellites have stayed up longer than the USSR's. More U.S. moons now circle the earth.

The American satellites have discovered that the earth has belts of radiation about it and that the earth has a pear shape. They have made the first determination of the density of micrometeors in interplanetary space and the first measurements of interplanetary magnetic fields. An American satellite first beamed the recorded human voice from space.

And Pioneer V has established a space communications record. Tiros I is sending to earth excellent photographs of the earth's cloud cover.

Against the U.S.'s 22 shots the USSR has made six.

But Russia has accomplished these feats:

Sputnik I, weighing four tons, on Oct. 4, 1957, became the world's first satellite. Sputnik II, weighing about the same, carried the dog "Laika" and led to the discovery that the sun significantly influences upper atmosphere densities.

Sputnik III carried 7,000 pounds aloft, 2,925 pounds of which formed the instrumented payload. On Jan. 2, 1959, Lunik I became the first artificial satellite of the sun.

The USSR's Lunik II, bearing the Soviet coat of arms, hit the moon on Sept. 13, 1959. Less than a month later Lunik III produced photographs showing 70% of the far side of the moon.

The payloads of these six shots weighed half again as much as the weight of all the U.S. payloads put together.

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The Space Race

Compiled by Science Service from official data.

NAME	LIFE DURATION	
Sputnik I, USSR 4-ton sphere	Oct. 4, 1957 to Jan 4, 1958	First man-made moon
Sputnik II, USSR 4-ton sphere	Nov. 3, 1957 to April 14, 1958	Bore dog, showed sun affects upper atmosphere density
*Explorer I, USA 31-pound cylinder	Jan. 31, 1958 to 1961-1963	Discovered radiation belt around the earth
*Vanguard I, USA 3.25-pound sphere	March 17, 1958 to 2158-2958	Still helping Army pinpoint islands in the Pacific
Explorer III, USA 31-pound cyclinder	March 26, 1958 to June 27, 1958	Temperature, radiation and cosmic dust data yielded
Sputnik III, USSR 7,000-pound cone	May 15, 1958 to April 6, 1959	Studied earth's magnetic field, micrometeors
Explorer IV, USA 38-pound cylinder	July 26, 1958 to Oct. 22, 1959	More valuable data on radiation belts
Pioneer I, USA 84.4-pound toroid	Oct. 11, 1958 to Oct. 12, 1958	Failed as moon probe but showed radiation is a band
Pioneer III, USA 13-pound cone	Dec. 6, 1958 to Dec. 7, 1958	Found second radiation belt around earth
Project Score, USA 8,750-pound unit	Dec. 18, 1958 to Jan. 21, 1959	First time a recorded human voice beamed from outer space
*Lunik, USSR 3,245-pound sphere	Jan. 2, 1959	Believed to be in orbit around the sun
*Vanguard II, USA 21-pound sphere	Feb. 17, 1959 to 1969 or more	Interpretation of data difficult
*Pioneer IV, USA 13-pound cone	March 3, 1959 into solar orbit	Radiation data
Discoverer I, USA 1,300-pound cylinder	Feb. 28, 1959 to March 5, 1959	Tumbling hampered signals to earth
Discoverer II, USA 1,610-pound cylinder	April 13, 1959 to April 26, 1959	Recovery experiment failed
*Explorer VI, USA 142-pound paddlewheel	Aug. 7, 1959 for year or more	First pictured earth from space
Discoverer V, USA 1,700-pound unit	Aug. 13, 1959 to Sept. 16, 1959	Re-entry capsule not recovered
Discoverer VI, USA 1,700-pound unit	Aug. 19, 1959 to Sept. 16, 1959	Re-entry capsule not recovered
Lunik II, USSR 858-pound sphere	Sept. 12, 1959 to Sept. 13, 1959	Hit the moon
*Vanguard III, USA 100-pound sphere	Sept. 18, 1959 to 1989-1999	Magnetic and micrometeorite studies
*Lunik III, USSR 4,037-pound station	Oct. 4, 1959 Fall expected soon	Photographed moon's hidden side
*Explorer VII, USA 91-pound unit	Oct. 13, 1959 to about 1979	Still broadcasting
Discoverer VII, USA 1,700-pound unit	Nov. 7, 1959 to Nov. 26, 1959	Did not operate properly
Discoverer VIII, USA 1,700-pound unit	Nov. 20, 1959 to March 8, 1960	Re-entry capsule not recovered
*Pioneer V, USA 90-pound paddlewheel	March 11, 1960; orbiting sun	Established long-distance radio record
*Tiros I, USA 270-pound hatbox	April 1, 1960 for decades	Photographing world's cloud cover
*Transit I-B, USA 265-pound sphere	April 13, 1960 for 16 months	Sends signals for navigation
*Discoverer XI, USA 300-pound capsule	April 15, 1960 uncertain	Recovery experiment failed

*Still in space.

GENERAL SCIENCE

Science Fair Days Proclaimed by Governor

NATIONAL Science Fair Days were proclaimed for May 10 through 14, 1960, by Gov. Harold W. Handley of Indiana, in an executive order.

In his proclamation, Gov. Handley stated that during the second week of May "the greatest concentration of winning teen-age science projects ever to be assembled in one place" will be in Indianapolis when the 11th National Science Fair-International opens at Butler University Fieldhouse. The international event is conducted annually by SCIENCE SERVICE, Washington, D. C.

The Governor cited the combined efforts of the many individuals, associations, and corporations who are cooperating in the science fair program. Scientists and educators agree, he said, that the fairs are a great stimulus to those students from whom will come the great scientists of tomorrow.

Urging all citizens to do everything possible to further stimulate and create scientists from the secondary school age group, Gov. Handley stated that "it is fitting and proper that we recognize and honor these scientists, their sponsoring teachers and parents."

Some 370 high school students will come to the National Science Fair-International as finalists from about 200 affiliated regional and area fairs. The official party of over 1,000 people will include the finalists, educators, scientists and press representatives. More than 60,000 visitors are expected.

Science News Letter, April 30, 1960

PSYCHOLOGY

"Saucers" Explained

MOST otherwise unexplained "flying saucers" are probably "afterimages," a peculiarity of perception well known to psychologists, Dr. Richard P. Youtz of Barnard College, New York City, reported to the Eastern Psychological Association meeting in New York.

You see an afterimage when you look at a bright object such as the sun or a photographic flash bulb and then stare at a bright plain field such as the empty sky or a blank wall. Sometimes the afterimage is the same color as the original object but sometimes it is a complementary color. Sometimes you see just one and sometimes a number of them.

Thus when a photographer takes pictures with flash bulbs you may afterwards see a flock of bulbs floating or dancing around in front of you and the bulbs may be bright yellow or dark purple. The color may change as you look at them.

You can help yourself to see the afterimage if you blink your eyes at a rate of about three times a second, Dr. Youtz told the psychologists.

The descriptions of "flying saucers" received from eyewitnesses could describe afterimages equally well. The "saucers" are of different size—sometimes small as a plate and sometimes large as a city block. The size of the afterimage also differs according to whether you see it nearby or far away. If you see an afterimage on the wall of your room, it will appear larger than if you see it on a cloud at 15,000 feet altitude.

The "saucers" may move at excessive speeds (but noiselessly). An afterimage seen on a cloud at 15,000 feet altitude seems to move with your eyes and thus appears to be faster than a jet plane.

The "saucer" often vanishes "mysteriously" after two or three minutes. So do afterimages.

The "saucers" may be of different colors and sometimes change color as do afterimages. The "saucer" has been reported to flash in the sun and flip around. The afterimage does this when you blink your eyes. "Saucers" are sometimes seen flying in formation. After bright flashes you can see images of several flash bulbs in a cluster.

Science News Letter, April 30, 1960

Sex Knowledge in Men

HOW MUCH a young man knows about sex and the "facts of life" is related to his intelligence but not to his marital status, sexual adjustment or his age, Drs. Leo Shatin and J. Alfred Southworth of the Albany Veterans Hospital and Albany Medical College reported at the meeting.

The young men studied by the psychologists were all patients in the psychiatry service of a general hospital. The average age was 33 years.

They were selected for study because sexual maladjustment is sometimes a symptom of mental illness and may aggravate or contribute to that illness.

The majority of the patients (85.7%) judged their own personal sexual adjustment to be satisfactory or better. Their therapists, however, judged 73% to be unsatisfactory or worse in sexual adjustment.

Science News Letter, April 30, 1960

Scientists and Poets

SCIENTISTS and poets mostly come from upper social classes but novelists may come from the upper or the lower classes.

This was found when psychologists made a study of the occupations of the fathers of major scientific and literary figures. The study was reported to the Eastern Psychological Association in New York by Drs. Stanley Coopersmith, Charles Church and Joseph Markowitz of Wesleyan University.

The individuals were selected for study on the basis of awards they received and evaluation by an expert.

Science News Letter, April 30, 1960

Aged Like Children

IF SOMEONE ASKS you to name the color in which a word is printed, it will take you longer to respond if the color is green and the word is "red"—longer than if you were giving the color of a blob of green ink.

The interference of the meaning of the printed word is great for an eight-year-old child. It decreases as you grow older until old age when it increases again.

This change with maturity and old age was reported at the meeting by Drs. Peter E. Comalli, Jr., Seymour Wapner, and Heinz Werner of Clark University, Worcester, Mass.

These findings, based on tests of 158 individuals aged from eight to 80, show the similarity of behavior of young children and old people, the psychologists reported to the meeting.

Science News Letter, April 30, 1960

ALTITUDE CHAMBER—Dr. Normal Lee Barr, of Republic Aviation Corporation, shows mice being tested under conditions at 50,000 feet. The chamber, a duplicate of one being built for humans, measures heartbeat, respiration and pulse as the "altitude" increases. From sea level to over 50,000 feet takes about a day of simulated space travel.

MEDICINE

Trachoma Vaccine Effective

A NEWLY developed vaccine against trachoma appears to be safe and effective, U.S. Navy researchers report.

More than 450 persons have been given the vaccine without any serious reactions. It has produced significant immunity in both monkeys and humans. The team that developed the vaccine is stationed at the U.S. Naval Medical Research Unit No. 2, Taipei, on the Island of Formosa. Their report appears in the Journal of the American Medical Association, 172:1577, 1960.

More than 400,000,000 persons are afflicted with this world-wide blinding disease. Now, this preliminary study of the effectiveness of the vaccine provides "some reasons for optimism," according to the team.

They were able to develop a vaccine that produced in humans an antibody response equivalent to that produced by natural trachoma infection. Presently, a field study to determine the vaccine's ability to prevent trachoma in uninfected children of families in which trachoma is prevalent has been started in a rural district on the west coast of Formosa. The team is also studying the effect of the vaccine on child victims of the disease.

There has been some evidence that the vaccine has curative possibilities also. Six blind persons were voluntarily infected with one of five trachoma viruses isolated on Formosa. They were then treated with vaccine injections. While far from conclusive, the results suggest that the vaccine has had a favorable influence on the course of the infections.

The trachoma virus was first reported isolated in Peking in 1957. The highly contagious disease, once an almost universal affliction, is still widespread in China, Egypt, India and other eastern countries.

The researchers are Drs. J. Thomas Grayston, San-Pin Wang, Yen-Fei Yang and Paul B. Johnston and Robert L. Woolridge.

Science News Letter, April 30, 1960

ASTRONOMY

Stars Found in All Ages, Sizes and Colors

ALL THE KINDS of stars now known can be found in each of the two main stellar groups, Dr. Wilhelmina Iwanowska of Perkins Observatory, Delaware, Ohio, reported to the American Astronomical Society meeting in Pittsburgh.

The Polish astronomer, who is on leave from the Observatory of Copernicus University, Torun, Poland, said that stars can be assigned to one of two large groups known as population I or II, depending on their origin in a galaxy. This division has been accepted by astronomers for several years.

Dr. Iwanowska's new suggestion is that the different kinds of stars—red or blue giants, dwarfs, white dwarfs, planetary nebulae, novae or other kinds of variable stars—should not be assigned to one population type but can occur in both.

This arrangement would allow for considerable range of ages with the possibility of present star formation in both population types. Astronomers have found stars as young as 300,000 years and more than three billion years. The present classification of a star, Dr. Iwanowska reported, results from its population type and age, with its its life history being governed by its mass.

Science News Letter, April 30, 1960

PSYCHIATRY

Older Persons May Cause Increase in Suicide Rate

MORE senior citizens commit suicide than do persons in any other age group. With more persons living to age 60 or more, the suicide rate will rise unless the medical profession does something about it, a Welsh doctor believes.

Of 881 suicides in Wales between 1951 and 1955, Dr. Alan Capstick of Whitchurch Hospital, Cardiff, Wales, found that nearly 40% of the persons who took their own lives were more than 60 years old. This is a disproportionately high percentage, since the over-60 age group does not make up 40% of the population.

Dr. Capstick checked suicide notes and statements by persons who last saw the victims alive to see if there was any clue that doctors could use to identify potential suicides.

He found that 39% of the suicides appeared depressed during their last hours. Such depression was reported most commonly in suicides aged 60 or more. Notes left by older victims usually included complaints of physical illness, references to the hereafter and a concern for relatives.

About 35% of all suicides studied appeared normal immediately before death but most of them had been depressed previously. These suicides occurred most frequently below age 30. Dr. Capstick reports that the normal appearance might be due to the victim's giving up the struggle and finding some peace in the belief that it was almost finished.

Notes left by those who appeared normal or emotionally disturbed—irritable, angry, worried, afraid or suspicious—more often indicated that the suicide was intended to hurt or take revenge on another person, in contrast to the "complaint type" of note left by the severely depressed.

Dr. Capstick also learned that nearly 80% had been under a doctor's care during the months before death. This factor indicates that the doctors could prevent some of the suicides if they could recognize the danger signals.

However, Dr. Capstick reports in the British Medical Journal, April 16, 1960, psychiatric treatment cannot prevent all suicides. The person who decides on death and then acts quickly probably cannot be stopped. And it is doubtful that medical intervention can save a really determined would-be suicide. Ninety-two of the persons studied committed suicide despite treatment in a mental hospital.

Science News Letter, April 30, 1960

GEOLOGY

New Zealand Sea Level Rising 8 Inches a Century

THE SEA LEVEL along the coast of northeastern New Zealand is rising at the rate of eight or nine inches every hundred years, it is reported.

This rise was determined from a study of the sea-level fluctuations along the coast of the Firth of Thames during the past 4,000 years. Whether it is part of an extended rise in sea level over many centuries or a comparatively minor fluctuation in an otherwise stable sea is not known.

The study, reported by J. C. Schofield of the New Zealand Geological Survey in Nature, 185:836, 1960, indicates that the sea level fell seven feet from 2,000 B.C. to about the beginning of the Christian era. Since then it has remained relatively stable.

The long-term fluctuations were determined by radiocarbon dating of seven shell samples and structural studies of storm ridges, high-spring-tide wash benches, and tidal stream flats.

Periods of sea-level highs were found to correlate well with periods of transgression recorded along the coast of Europe.

Science News Letter, April 30, 1960

ASTRONOMY

Faint Comet Found In Southern Sky

A FAINT comet, the second new one to be discovered this year, has been spotted in the southern sky.

A telescope equipped to take photographs is needed to see this new celestial object, which is traveling southward in the sky and is now in the constellation of Leo, the lion. News of the discovery of Comet Wild was sent to astronomers by Harvard College Observatory, clearing house for astronomical information in the Western Hemisphere.

Science News Letter, April 30, 1960

IN SCIENCE

METEOROLOGY

Rain Making Still Puzzle After Three-Year Survey

A SURVEY of three years of rain making efforts in California has left unanswered the question of whether seeding clouds with silver iodide thrown into the air from the ground actually produces more rainfall than would have occurred naturally.

The scientific survey shows that further experiments are needed to solve the puzzle of why some clouds produce rain and others do not, and of whether man's interference can affect rainfall amounts.

Drs. Jerzy Neyman, Elizabeth L. Scott and Marija Vasilevskis of the University of California, Berkeley, report on the effectiveness of a scientific cloud seeding program during the period from 1957 through 1959 in Science, 131:1073, 1960. The Santa Barbara project they studied is rare in weather control projects because the determination of whether or not to seed at any time was decided, in effect, as by the flip of a coin.

Science News Letter, April 30, 1960

TECHNOLOGY

New Radar Takes Detailed Pictures

A REVOLUTIONARY radar system announced by the U.S. Army takes sharp pictures of distant terrain through an antenna.

A plane flying in friendly territory can take pictures of an enemy area far away. The picture that is produced has great detail. It looks as if it were taken from directly over the enemy area.

The radar antenna is mounted on the underside of observer planes. The system sends out radar pulses and records their return on film. The film contains signals that are processed into a detailed picture.

The detail is as good for distant areas as for close ones.

The radar was produced by scientists and engineers at the University of Michigan's Willow Run Laboratories. The Laboratories' director, Dr. J. A. Boyd, said, "The Army commander will have an airborne device that can observe enemy territory both day and night, during all kinds of weather.

"The operating ranges are such that the system can provide valuable information for the Army's long-range missiles."

The radar system in the airplane weighs 700 pounds. Its detailed pictures result from the narrowness of the new radar's beam. But the final picture is a wide strip map produced by joining together the small beam's signals.

The cost of developing a complete unit was $1,200,000. The Army reports future units will cost about $600,000 each.

Science News Letter, April 30, 196

NCE FIELDS

ANTHROPOLOGY

Christmas Wrappings for Volcano Goddess Pele

DURING volcanic eruptions in Hawaii, persons from all walks of life make repeated offerings to the volcano goddess Pele.

This custom is mainly of local origin, but Western influence can be seen in the Christmas wrappings and ribbons around the offerings of breadfruit, banana, pork and tobacco, two scientists report in Science, 131:1095, 1960.

A questionnaire is now being circulated among evacuees from the village of Kapoho, which was covered by lava this year, report Drs. Roy Lachman and William J. Bonk, both of the University of Hawaii.

One aim of the questionnaire is to establish the relationship between the Hawaiian people's "security seeking" behavior during volcanic eruptions and various cultural patterns, level of education and earlier experiences in time of stress.

The inquiry is conducted in English, local pidgin English, Japanese, Korean and three Filipino dialects.

The scientists report that the sacrifices to Pele were not confined to one religious or ethnic group, or educational level.

Among the believers in Pele are highly educated and prominent citizens of the islands. The gifts to Pele are thrown on the lava flow, and often a song is chanted or read during or after the offering is made.

Science News Letter, April 30, 1960

Trout Protector Measures Lamprey Killing Poisons

CONCENTRATIONS of the chemical used to poison fish-killing lampreys may now be measured quickly and accurately, making it easier to ensure that concentrations of the poison, called TFM, do not become great enough to harm trout and other fish.

The lamprey is an eel-like parasite that attaches itself to other fish and, by sucking out their body-juices, eventually kills them. Some years ago they were mostly found in the St. Lawrence River; however, since then, they have migrated as far as the Great Lakes where they have played havoc with the fishing industry. Between 1946 and 1955, for example, the trout harvest from Lake Michigan alone dropped from 6,500,000 pounds to a mere 34,000 pounds.

Prof. M. A. Smith of Bucknell University, Lewisburg, Pa., reported at the American Chemical Society meeting in Cleveland, Ohio, that TFM (3-tri-fluoromethyl-4-nitrophenol), has been found effective in killing lamprey larvae, while leaving other fish unharmed, providing the TFM concentration does not rise above eight parts per million.

An instrument called a photoelectric colorimeter determines the quantity of TFM, at these low concentrations, with an accuracy better than 0.2 parts per million. Prof. Smith said that the instrument registers a vivid yellow color when the concentration becomes too high. The new technique has been developed to give rapid, accurate results in the field. The water sample to be tested is passed through a fine screen and treated with alkali, in the presence of which TFM gives the brilliant yellow color, the intensity of which is measured with the photoelectric colorimeter.

Dr. Vernon C. Applegate of the U.S. Bureau of Commercial Fisheries, Rogers City, Mich., and B. G. Herbert Johnson of the Fisheries Research Board of Canada, London, Ontario, were co-authors of the report.

Science News Letter, April 30, 1960

MATHEMATICS

Electronic "Brains" Chat Via Telephone Lines

ELECTRONIC "brains" are talking to each other over telephone lines and microwave radio. They are helping to manage the development of some of America's big rocket engines.

Rocketdyne Division of North American Aviation, Inc., has linked its engineering labs and test stands in California, Texas and Missouri by leased wire to two big "brains" at headquarters in Canoga Park, Calif. Then the "brains" talk by radio with North American Aviation, Inc., "brains" in Los Angeles.

These computers talk about missiles being developed. They chat about whether a program is on schedule or not, what parts are in short supply, how the production line is performing and whether the project is within the budget.

They have a language of their own. They converse in this mathematical language at a rate of 75,000 "words" a minute.

By keeping track of all the details of building missiles like Thor and Atlas, the machines are expected to save $50,000 a month.

Science News Letter, April 30, 1960

CIVIL ENGINEERING

Asbestos Improves Roads When Added to Asphalt

TOUGHER ROAD SURFACES result from the addition of two percent or three percent asbestos fiber to asphalt, a research project of the Johns-Manville Corporation indicates. In practice, this might reduce road maintenance costs, estimated at nearly $2.5 billion for 1960, by hundreds of millions of dollars. Tests have demonstrated that asbestos-asphalt paving mixes give a tougher road surface with increased resistance to indentation under heavy load and high temperatures, less brittleness under low temperatures, increased flexibility and resiliency, and increased resistance to cracks resulting from exposure to all kinds of weather.

Science News Letter, April 30, 1960

CHEMISTRY

Chemists Switch Atoms, Find Antihistamines

A CLASS of highly active antihistamine drugs has been found.

Miss Ellen Donoghue, a chemist for CIBA Pharmaceutical Products Inc., told a meeting of the American Chemical Society in Cleveland, Ohio, that she and her colleagues have been working on a chemical group of substances called isoindolines. They believed they could make a substance with antihistaminic activity by pulling an atom out of the isoindoline molecule's nucleus and putting a different atom in the empty space.

It worked. The new compound was a fairly good antihistamine, but the chemists were not satisfied. They began knocking atoms out of the sides, top, bottom, middle, front and back of the new molecule. Each time they substituted an atom, they got a new compound.

There were hundreds of compounds, some not so active, and others quite powerful. The one that packs the biggest punch is pyrindene, which has a carbon atom in place of nitrogen atom in the nucleus. It is more than twice as potent as the best antihistamine known.

In two years of clinical testing, 2,500 patients took three to four milligrams of pyrindene per day. The new drug was "very effective," Miss Donaghue said, and there were few side reactions.

Coauthors of the paper were Miss Patricia Wenk and Drs. C. F. Huebner, E. Sury and J. A. Nelson.

Science News Letter, April 30, 1960

CHEMISTRY

Chemical Process Bonds Polyethylene to Copper

A CHEMICAL METHOD of coating copper with plastic—of particular value for sealing transoceanic cables—has been reported.

The bonding method forms chemical grippers on polyethylene plastic that cling to the copper, eliminating the need for adhesives, Dr. Arthur T. Spencer of the Bell Telephone Laboratories, Murray Hill, N.J., told the American Chemical Society meeting in Cleveland, Ohio.

The method, which also may be used in flexible printed circuits and microwave devices, makes use of the oxidation of the polyethylene in contact with an oxide film on the metal in a short-time, high-temperature molding operation. There is no intermediate adhesive layer.

High and reproducible bond strengths are achieved by the process between a wide range of polyethylenes and copper alloys bearing at least 85% copper. Bonds formed by this method failed through tearing in the polyethylene rather than by a lack of adhesion at strength values at least several times those obtained by methods now in commercial use.

Coauthor of the paper was Richard G. Baker, also of the Laboratories.

Science News Letter, April 30, 1960

RADIO ASTRONOMY

Listen In On Other Suns

Radio astronomers are listening for intelligent radio signals from neighboring solar systems. Universal laws of nature have told scientists about what to expect.

By GLORIA BALL

"BEEP . . . beep beep . . . beep beep beep . . . beep beep beep beep . . . . . beep . . . beep beep . . ."

These sounds, similar to Morse code, could be the first evidence of intelligent beings outside the solar system. Converted into visible signals on a graph, the sounds would look like so many humps on a camel's back.

Until about the middle of May, astronomers at the National Radio Astronomy Observatory in Green Bank, W. Va., will be checking their instruments and listening six hours a day, seven days a week, for possible radio signals from intelligent civilizations in neighboring planetary systems.

The Green Bank observatory, a facility of the National Science Foundation, is the first to launch such a program. At best it is a long shot. But success—actual contact with other beings—could bring about unforeseen revolutions in scientific and philosophical thinking.

The program is largely the brain-child of Dr. Frank Drake, a young radio astronomer who will direct the listening operations. He has named the project "Ozma" after the legendary Land of Oz, a faraway place inhabited by strange and mysterious beings. But the places that Dr. Drake will study for signs of intelligent life are very real. They are Tau Ceti and Epsilon Eridani, two stars in our Milky Way Galaxy.

Each of these stars is about 11 light years away, and each is a twin to our sun (a single star, about as hot as our sun and may have planets). Whether planets and life, particularly intelligent life, actually exist, no one knows.

Sending and Receiving

There is no indication, Dr. Drake said, that anyone has been trying to contact us, but until now our instruments were not sensitive enough to detect such weak signals.

How, then, will Project Ozma find out if the signals are really there?

An 85-foot radio telescope picks up radio noise and signals from either star and any planets it may have. Most of the static noises originating on earth and in outer space are filtered out electronically. Remaining signals, if any, are fed into an amplifier which boosts the sounds into the audible range or converts them into visible waves traced on a graph.

For the time being, Dr. Drake is using the tracing method in order to have a permanent record for study.

Since it is highly unlikely that other beings would use Morse code with the same meaning of dots and dashes we know, how will they communicate and what will they say?

Mathematics is the most nearly universal language. A likely message is some simple repetition of prime numbers, simple sums, multiples or even consecutive numbers, such as "one . . . two . . . three . . . four . . . . . one . . . two . . ." These would come in as so many pulses or beeps, Dr. Drake says.

Other universal facts have helped radio astronomers choose 1,420 megacycles (21-centimeter wavelength) as the frequency most likely to yield purposeful signals.

In outer space a considerable amount of energy is radiated at this frequency by hydrogen atoms. This frequency is unique throughout the universe.

In addition, it is in the range of minimum interference due to radiation noise in the earth's atmosphere and in outer space.

Thus, 1,420 megacycles is more or less the natural frequency for sending and receiving long range signals. Other civilizations would come to the same conclusion, radio astronomers reason.

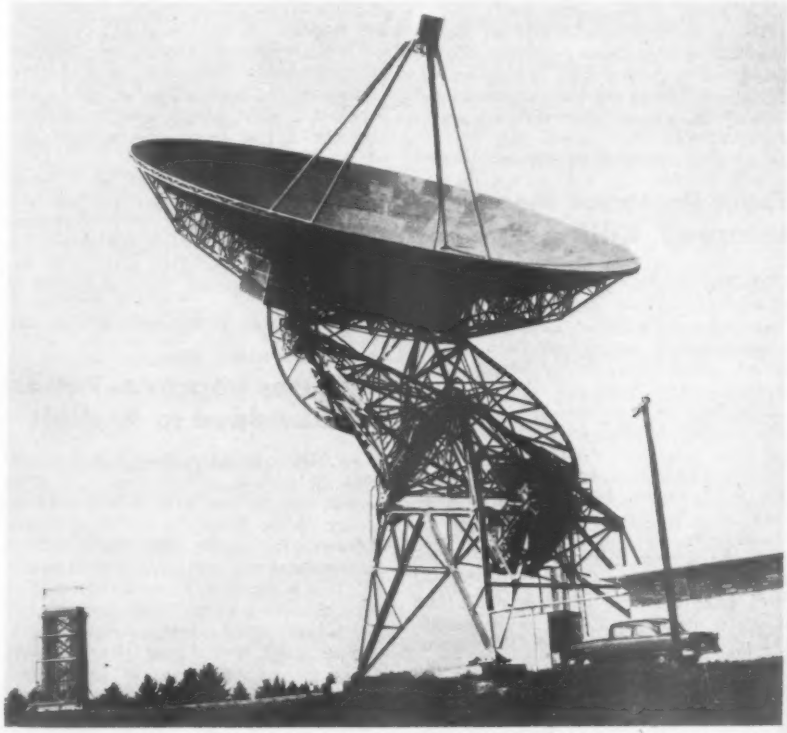
At the present time there are about 15 radio telescopes throughout the world observing 1,420 megacycle outer space radiation on a 24-hour basis. But none of them are equipped to screen any intentional signals out of all the interfering noise. Not that the extra equipment is expensive. Far from it. Project Ozma has cost so little that the National Science Foundation has not set aside special funds for it.

Maser Does the Job

Most of the money spent on Ozma has gone into building a radiometer full of electronic devices primarily intended to filter out static. But the main gadget that does the job is the low-noise maser amplifier component.

Based on principles of solid state physics, the maser was invented in 1956 and came into practical use in 1959. At that time Dr. Drake began planning for the Big Listen. The maser's ability to increase receiver sensitivity to a maximum is the technological trick that makes Project Ozma possible.

And now that all the machinery has been set in motion, is there actually a beep or



THE BIG EAR—This 85-foot radio telescope at the National Radio Astronomy Observatory in Green Bank, W. Va., is listening for signals from Tau Ceti and Epsilon Eridani, two stars that may have planets with life.

a camel-humped signal? Not yet. Dr. Drake is still calibrating the instruments, and the first real listening will begin when that job is finished.

Basing his statement on astronomical probabilities, Dr. Otto Struve, director of the observatory at Green Bank, believes that almost certainly there are planets other than those in our own sun's realm. Life probably does exist on some of them, As to whether that life is intelligent, "we have no answer to that question," he said.

The probability of getting intelligent signals at this time cannot be definitely calculated, but it is very small.

But the Green Bank radio astronomers are going ahead in spite of being a bit embarrassed by insinuations that the project is so improbable that it smacks of science fiction.

"We realize that our chances of success are extremely small," Dr. Drake said, "but we wish to proceed—for the experience—so we will be able to build optimum systems when the chances become appreciably larger."

What will happen if a signal does come through?

The first step is decoding the message, which could be more complex than numerical repetition. At the same time, the electronic apparatus would be hooked up to a larger telescope to get a stronger signal. The 140-foot ear, now under construction at Green Bank, will be used even if no sounds come through the 85-footer.

Dr. Drake makes no guesses about how advanced the sending civilization may be. Certainly it will have to be advanced enough to build a transmitter capable of sending a signal this far. It may be at our own civilization's level or millions of years ahead of ours, he said.

Will we try to send an answer back or return the signal?

No plans have been made for sending. As one worker associated with Ozma put it, "this project is still worrying about its ears. It has not even thought about a mouth yet."

A one-megawatt transmitter would furnish power enough to send a signal back to Tau Ceti or Epsilon Eridani, Dr. Drake calculates. We have that ability and could answer.

To pessimists who believe that we should not answer because we may be a marvelous beef animal for the other civilization, Dr. Drake replies, "Nonsense."

Although it would take 22 years to get an answer, the far-off Wizards of Ozma might be able to tell us how to cure cancer or how to live in peace.

Science News Letter, April 30, 1960

Do You Know

Rheumatic fever and resultant heart disease is the fifth leading cause of death among children of ages 5 to 14.

The treponematosis of *yaws*, similar to syphilis but transmitted by simple contact, is mainly a disease of poverty and faulty hygiene.

ROCKETS AND MISSILES

Optical Inspector Probes Hard-to-Get-at Interiors

AN OPTICAL inspection device designed to give a detailed interior view of the grain bore for solid rocket motors has been developed.

It may also be used, in a portable version, to probe pipes, tanks, airplane wings, boilers, or any type of irregular enclosure presenting hard-to-get-at interiors.

Developed by Aerojet-General Corporation, Azusa, Calif., the optical grain checker can inspect an opening down to two inches in diameter. It features a safe external light source, a mirror that is driven along a slotted optical tube, and a specially designed telescope that magnifies the image of the grain reflected by the mirror.

The checker can be fitted with a camera for detailed photographs of possible cracks.

Science News Letter, April 30, 1960

SURGERY

Snipped Ear "Springs" Beautify Appearance

PERSONS with bat wing-like or cupped ears can now have beautiful and normal ears by undergoing a simple surgical procedure that snips the "springs" in the ear shell, a reconstruction surgeon of New York reported.

The "springs" are actually sections of cartilage in the ear's shell. There are four such distinct springs, Dr. Louis Joel Feit reported at a meeting of the American Otorhinologic Society for Plastic Surgery, Miami, Fla.

He said his studies of the physiology and mechanical action of the ear have shown that there are three springs with "leaflet" action like the leaf springs in an automobile, all in the outer shell, and with a torque action like a coiled wire, directed into the ear. Two of the leaflet springs run up and down the ear, the other runs horizontally.

The surgeon's method is to break one or more of these springs surgically, depending upon the deformity. He emphasized that the result is not only an ear in the correct position but a beautiful ear with all the natural "landmarks" or folds. In the past, ears were merely pinned back surgically, so they would not be seen.

Science News Letter, April 30, 1960

Questions

GENERAL SCIENCE—How many high school students will come to the National Science Fair-International as finalists? p. 278.

MEDICINE—What dose is given of the new polio vaccine? p. 277.

RADIO ASTRONOMY—Why was the frequency of 1,420 megacycles chosen for sending signals on the Ozma project? p. 282.

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• Books of the Week •

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ALASKA'S RAILROAD BUILDERS: Mike Heney—Edward A. Herron—*Messner*, 192 p., $2.95. Juvenile biography.

APPLICATIONS OF THERMOELECTRICITY—H. J. Goldsmid—*Wiley*, 118 p., $2.25. Introduction to the subject written by specialist.

ARTHRITIS AND YOU—James W. Brooke—*Harper*, 150 p., $3. Written by physician for the arthritic and his family.

BANGKHUAD: A Community Study in Thailand—Howard Keva Kaufman—*Augustin*, 235 p., illus., $5.50. Monograph of the Association of Asian Studies, about the function of the wat (Buddhist church) in a small rural village.

BASIC ULTRASONICS—Cyrus Glickstein—*Rider*, 137 p., illus., $4.60; paper, $3.50. General theory and basic types of ultrasonic equipment.

BIOLOGY—Alfred M. Elliott and Charles Ray, Jr.—*Appleton*, 723 p., illus., $8. For the beginning college student.

THE BIRDS—Oskar and Katharina Heinroth—*Univ. of Mich. Press*, 181 p., illus., paper, $1.95. About bird habits and bird senses, originally published in Germany.

CASSELL'S SPANISH DICTIONARY: Spanish-English, English-Spanish—Edgar Allison Peers and others, Eds.—*Funk*, 1477 p., $7; thumb-indexed $7.75. Comprehensive new dictionary, incorporating Latin-American usage.

CAVES OF ADVENTURE—Haroun Tazieff, transl. from French by Alan Hodge—*Viking*, 222 p., photographs, paper, $1.45. Expedition into the labyrinth of caves 2,000 feet underground in the Pyrenees.

THE CHANGING MIDDLE EAST—Emil Lengyel—*Day*, 376 p., $5.75. Deals mainly with events in the decade 1950-60, and covers the region from Libya to Iran.

COMMUNICATION: From Stone Age to Space Age—Harry Edward Neal—*Messner*, 192 p., photographs, $3.50. A non-technical survey from sign language to radio signals via satellite.

CONQUEROR OF SMALLPOX: Dr. Edward Jenner—I. E. Levine—*Messner*, 190 p., $2.95. Juvenile biography.

COSMETIC SCIENCE—A. W. Middleton, Ed.—*Butterworths (Canada)*, 327 p., illus., $12. Papers and discussions of the First British Congress on Cosmetic Science, London, 1959.

THE CRAFT OF TECHNICAL WRITING—Daniel Marder—*Macmillan*, 400 p., $5. Textbook on techniques of organization, structure and style.

CRYSTAL GROWTH: Discussions of the Faraday Society, 1949—N. F. Mott and others, introd. by W. E. Garner—*Butterworths (Canada)*, 366 p., illus., $12. Nucleation and normal crystal growth, abnormal and modified growth, and technical aspects of mineral synthesis.

DIVE! The Story of an Atomic Submarine—Commander H. B. Harris-Warren—*Harper*, 130 p., photographs, $2.95. Young reader's introduction to life and work on an atomic submarine.

ENERGY AND MAN: A Symposium—Allan Nevins and others, introd. by Courtney C. Brown—*Appleton*, 113 p., $3.75. Other participants were Robert G. Dunlop, Edward Teller, Edward S. Mason, and Herbert Hoover, Jr.

FLUIDIZATION AND FLUID-PARTICLE SYSTEMS—Frederick A. Zenz and Donald F. Othmer—*Reinhold*, 513 p., illus., $15. Reference work for the practicing engineer, covering developments in fluid-solids processing, including the moving bed techniques, fluidization, and transport reactors.

FROM ENGINES TO AUTOS: Five Pioneers in Engine Development and Their Contributions to the Automotive Industry—Eugen Diesel, Gustav Goldbeck and Friedrich Schildberger—*Regnery*, 302 p., illus., $6. Story of the five German inventors: Otto, Daimler, Benz, Bosch and Diesel.

FUN WITH SCIENTIFIC EXPERIMENTS—Mae and Ira Freeman—*Random House*, 59 p., photographs, $1.50. Gives boys and girls directions for simple experiments which explain basic scientific laws.

THE GEOLOGICAL EVOLUTION OF NORTH AMERICA: A Regional Approach to Historical Geology—Thomas H. Clark and Colin W. Stearn—*Ronald*, 434 p., illus., $7.50. Presents historical development of the continent in terms of the bordering geosynclines, the stable interior and the Canadian Shield.

GERMAN-ENGLISH MATHEMATICS DICTIONARY—Charles Hyman—*Interlanguage Dictionaries*, 131 p., $8. More than 8500 entries with subtitles and synonyms.

THE GERMAN VEST POCKET DICTIONARY: German-English and English-German—Jenni Karding Moulton, William G. Moulton, Ed.—*Random House*, 400 p., $1.65. 40,000 entries, based on American usage.

HELPING YOUR GIFTED CHILD—Ruth Strang, introd. by Cyril William Woolcock—*Dutton*, 270 p., $4.50. Deals with very bright children, IQ's of 145 or higher, and their developmental growth through various age levels.

HEMOPHILIA AND OTHER HEMORRHAGIC STATES: International Symposium, Rome—Kenneth M. Brinkhous and Pietro de Nicola, Eds.—*Univ. of N.C. Press*, 266 p., illus., $7.50. Papers on recent advances in the field.

AN INTRODUCTION TO CHEMICAL NOMENCLATURE—R. S. Cahn—*Butterworths (Canada)*, 96 p., paper, $2.25. Describes principles of modern systematic nomenclature and treats both inorganic and organic chemistry.

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MEASURING THE INVISIBLE WORLD: The Life and Works of Antoni van Leeuwenhoek—A. Schierbeek, biog. chapter by Maria Rooseboom—*Abelard-Schuman*, 223 p., illus., $5. Short history of the life work of the 17th century scientist who was the first to measure microscopic objects.

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MEN OF MEDICINE—Katherine B. Shippen—*Viking*, 220 p., illus. by Anthony Ravielli, paper, $1.25. Five thousand years of the art of healing.

THE MERCK INDEX of Chemicals and Drugs—Paul G. Stecher, Ed.—*Merck & Co.*, 7th ed., 1641 p., $12. Expanded encyclopedia for chemists, pharmacists, physicians, and allied professions.

THE MODERN ASPECT OF MATHEMATICS—Lucienne Felix, transl. from French by J. H. and F. H. Hlavaty—*Basic Bks*, 194 p., $5. Exposition of recent mathematical developments of the French Bourbakiste group which seeks to merge the traditional compartments of mathematics into one interrelated system.

MOLECULES IN MOTION—T. G. Cowling—*Harper*, 183 p., paper, $1.35. An introduction to the kinetic theory of gases.

MOST-OFTEN-NEEDED 1960 TELEVISION SERVICING INFORMATION—M. N. Beitman, Ed.—*Supreme Publications*, 192 p., illus., paper, $3. Diagram, alignment facts, voltage values, wave forms and other service data.

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PHYSICS AND MICROPHYSICS—Louis de Broglie, transl. by Martin Davidson, foreword by A. Einstein—*Harper*, 286 p., paper, $1.50. Expositions on physics and the history and the philosophy of science.

PLANT LIFE THROUGH THE AGES: A Geological and Botanical Retrospect—A. C. Seward, includ. 9 reconstructions of ancient landscapes by Edward Vulliamy—*Hafner Pub. Co.*, 603 p., illus., $12.50. Reprint of second edition, 1933. Paleobotany for the non-specialist.

PLANT PATHOLOGY: An Advanced Treatise, Vol. II: The Pathogen—J. G. Horsfall and A. E. Dimond, Eds.—*Academic*, 715 p., illus., $22. Specialists discuss the antecedents of plant diseases and how disease originates.

PRINCIPLES OF UNIT OPERATIONS—Alan S. Foust and others—*Wiley*, 578 p., illus., $15. For junior students in chemical engineering, text emphasizes the general principles underlying groups of operations.

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SCIENCE IN PROGRESS—Armand J. Eardley and others, Hugh Taylor, Ed.—*Yale Univ. Press*, 11th ed., 379 p., illus., $7.50. On the cause of mountain building, on radio astronomy, chemical anthropology, viruses as cause of cancer, and other recent research.

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THEORIES OF SCIENTIFIC METHOD: The Renaissance through the Nineteenth Century—Ralph M. Blake, Curt J. Ducasse and Edward H. Madden, Ed.—*Univ. of Wash. Press*, 346 p., $6.50. Investigates scientific concepts through five centuries of Western thought.

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CHEMISTRY

Ways to Save Helium

EVERY DAY millions of cubic feet of helium, one of our most precious natural resources, are wasted, and Congress is considering bills aimed at conserving this basic chemical element.

It has been proposed that 12 new extraction plants be built soon, either by Government or private industry, to begin immediate extraction of helium from natural gas. In this way, it is estimated, 52 billion cubic feet of helium, which otherwise would be wasted, could be saved over the next 25 years. It is proposed that this extracted helium should be stockpiled underground in the Government-owned Cliffside gas field near Amarillo, Texas.

It is also estimated that the conservation project would pay for itself within this period of 25 years.

Suggestions along these lines were made by Secretary of the Interior Fred A. Seaton, and are now incorporated in four bills being studied by the House of Representatives' Committee on Interior and Insular Affairs.

Helium occurs as a minor constituent of natural gas, and when this gas is burned in furnaces and kitchen stoves, the helium is lost to the atmosphere. The natural gas from the Texas and Oklahoma panhandle regions and from Kansas contains up to two percent of helium. This has been the source of helium for the Western world since World War I, and is still the only large-scale source in the Western world. The demand for helium is increasing day by day, and it has become clear that the U.S. must act quickly to conserve what reserves there are.

Helium production now is about 635,000,000 cubic feet a year. This presently exceeds the demand, but the demand is expected to rise and overtake the present supply by 1962.

Helium is used in balloons, in shielded arc welding, and in missile research mainly, although there are many other smaller scale uses. However, helium gas is especially suitable for use in gas-cooled atomic reactors, and the demand is expected to rise rapidly when these are operational in the U.S.

Helium is extracted from natural gas by a freezing process which liquefies everything except helium, the lowest boiling point gas of all, followed by a scrubbing process using liquid nitrogen.

Science News Letter, April 30, 1960

CHEMISTRY

Oil Can Be Stored Five Years in Tropics

A SYNTHETIC jet plane oil that can be stored in tropical areas for five years without deteriorating has been developed.

It is believed to have the highest storage stability of any jet oil ever developed and is now being supplied to the military in large quantities.

Developed by Esso Research and Engineering Co., Linden, N.J., the new oil not only conforms with current military specifications but is expected to meet even more stringent requirements now being established.

The Air Force requires that an oil retain fluidity and ability to lubricate at engine temperatures averaging around 300 degrees Fahrenheit. The oils must also function properly when a plane's engine is started in the arctic at 65 degrees below zero Fahrenheit.

In addition to remaining stable at extremes of temperature, jet oils must be non-corrosive to the variety of metals used in today's turbine engines, including copper, steel, silver, lead, aluminum alloy and magnesium alloy.

Science News Letter, April 30, 1960

MEDICINE

Congenital Heart Defects May Be Aided by Surgery

EACH YEAR an estimated 30,000 to 40,000 American children are born with congenital heart defects. Thanks to rapid advances in heart surgery, four out of five such children can now be helped by various operations. In its new booklet, "If Your Child Has A Congenital Heart Defect," the American Heart Association tells parents that many congenital heart defects are neither as rare nor as hopeless as they were once thought to be.

Science News Letter, April 30, 1960

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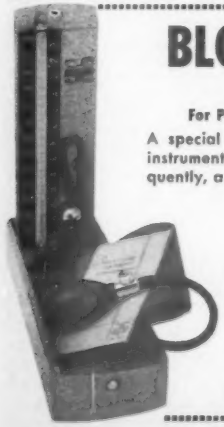

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By Paul Stag

How would you like to catch more fish than you ever caught in your life? How would you like to catch fish when they're not biting for other fishermen on the lake? How would you like to never come home empty handed?

I've been fishing for over twenty-five years. I've tried just about every kind of lure I've ever seen in a store or in an advertisement. And just like you, I found that they caught some of the fish some of the time, but most of the time they caught nothing. But now I have found an imported lure that catches fish better than any lure I ever used!

I've caught fish time after time when other fishermen have come home empty handed. I've caught fish on the Vivif when even live bait failed! Vivif has caught fish for me at all hours of the day . . . in all kinds of weather. This amazing lure made fish bite. And now I've gotten the exclusive rights to introduce this lure in America and I'm out to prove my statement: "This is the finest lure ever invented."

A French Invention

This amazing lure was invented in France by a French sportsman who named it "Vivif." He spent years testing every possible kind of lure on fish and watching how they reacted to each lure under water! Who ever did that before? From those years of testing this Frenchman developed Vivif . . . the patented lure with the "Live" tail.

When he started selling Vivif in France it became one of the largest selling fish lures in Europe! Soon its fame spread to 25 foreign lands! From all over came incredible reports of how Vivif caught fish.

Vivif holds a British record in England. It has made amazing catches in Australia, Denmark, France, Germany, South Africa and Canada.

Last winter I started importing Vivif to America. I gave it to expert, experienced fishermen to test. They reported, "We didn't believe it but it's true. Vivif caught fish when other lures failed." That's what hard boiled experts say.

But even more important to you is what other average fishermen say. Here's a typical letter . . . from Mr. Robert Hilton of Jacksonville, Florida. "I have used artificial lures from Canada to Florida and have worn out four spinning reels. The VIVIF is far superior to any lure that I have ever used. The day I used Vivif the bass were not biting, even on live shiners. I caught 6 bass on the lure and then lost it to a large bass. The bass broke water three times trying to throw the lure after he broke my 12-pound monofilament line."

From everywhere come their reports of how Vivif makes fish bite like magic . . . of the magic appeal it seems to have . . . of how it out-fishes and outcatches any lure they have ever used.

Why is this true? Frankly I don't know. All I know is that Vivif is different from any lure you ever used. It's the world's most lifelike lure in the water. It even keeps moving on a slackened line! And it is pure magic with bass, pickerel, pike, trout and other game fish.

Think what this means to you. Now at last you can catch just about every kind of fresh water gamefish and panfish as well as many salt water fish. You can do away with digging for worms, catching bugs, frogs or minnows. You can cast, troll, shore fish . . . all with equal success. You can go out after . . . and come back with largemouth bass, smallmouth bass, pike, pickerel, perch, trout, and walleyes and do it time and again without previous experience and whether you are an expert fisherman or using a cane pole . . . or your money will be refunded *at any time!*

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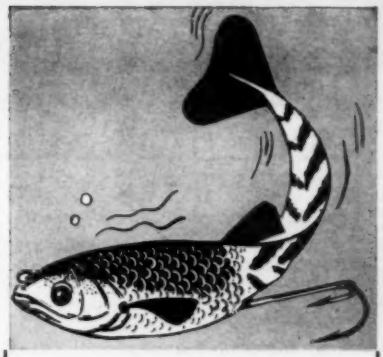
Seldom if ever has a fish lure received such an exciting reaction from fishermen. Amazing catches have been reported from all over the world. In England Vivif holds a British record! In 25 foreign lands Vivif is catching fish like magic. Already reports from fishermen in this country are pouring in . . . reports saying Vivif is the greatest lure they have ever used. Fishermen in 25 countries can't be wrong. "Vivif is the finest lure I have used in 25 years of fishing!"

Marvel of Design

Not just another stiff plastic or wood lure that "looks good" but doesn't work. Vivif is made of lifelike latex and is the world's most lifelike lure in the water . . . works better than live bait! Color combinations have been scientifically selected in actual tests. Perfectly balanced, Vivif doesn't spin . . . never twists your line. Acts and wiggles like a live minnow even on a slackened line.



HOW VIVIF WORKS!

Fish have never seen anything like this lure before. It attracts fish from far away by its vibrating tail that sends "sound waves." It is the world's most lifelike lure in the water. Fish can't resist it . . . and when they grab the lure it "feels lifelike"—doesn't warn them to spit it out before you can sink the hook in! Read this article and learn the amazing story of this imported lure.

AMAZING TRIAL OFFER!

No longer do you have to come home empty handed from your fishing trips. Try amazing Vivif . . . the French lure designed to attract and catch fish . . . without risking a penny.

All you do is mail the amazing no-risk trial coupon below. When you receive your Vivifs, use them anywhere you like . . . use them as often as you like . . . to prove its fantastic fish-catching powers.

Use it to catch bass, trout, perch, pike, walleyes, plus salt water fish . . . any sport or panfish you like to catch.

Let your children and friends fish with Vivif. Put Vivif to every test. If you don't agree it is the finest lure you've ever used . . . if it doesn't catch more fish and bigger fish, you have used it entirely free. It won't cost you a penny.

VIVIF IS IMPORTED SUPPLIES ARE LIMITED

To get your Vivifs now, mail the Amazing no-risk trial coupon below. U. S. supplies are still limited. Order now to be sure you'll have your Vivifs in time for your next fishing trip. Only if you act at once can I guarantee to fill your order immediately. Don't delay. Mail coupon today.

MAIL AMAZING NO-RISK TRIAL COUPON TODAY

Harrison Home Products Corp., Dept. 5 SNL
Fishing Tackle Division
8 Kingsland Avenue, Harrison, New Jersey

Please send VIVIF's checked below on AMAZING TRIAL OFFER. If VIVIF does not catch more fish . . . bigger fish . . . and make fishing more fun—if VIVIF is not the greatest lure I've ever used you will refund my money immediately . . . including postage.

Quan.	Size	Weight	Color Comb.	Price
.....	2¼"	1/6 oz.	Green-Silver-Red	○ $1.35
.....	2¼"	1/6 oz.	Black & Gold	○ $1.35
.....	2¼"	1/6 oz.	Green-Gold-Red	○ $1.35
.....	2¼"	1/6 oz.	Red & White	○ $1.35

SAVE! ALL 4 THIS SIZE FOR $4.95

.....	3"	1/3 oz.	Brown-Silver-Red	○ $1.65
.....	3"	1/3 oz.	Black-Silver-Red	○ $1.65
.....	3"	1/3 oz.	Green-Gold-Red	○ $1.65
.....	3"	1/3 oz.	Red & White	○ $1.65

ALL 4 THIS SIZE FOR $5.95

.....	5½"	2½ oz.	Green & Yellow	○ $2.49
.....	5½"	2½ oz.	Red & White	○ $2.49
.....	5½"	2½ oz.	Blue & Silver	○ $2.49

ALL 3 THIS SIZE FOR $6.95

☐ **PAYMENT ENCLOSED.** Send VIVIF's Postpaid! I save all C.O.D. Charges. (Money Back Guarantee on all VIVIF's.)

☐ **SEND C.O.D.** I will pay postman price of VIVIF's plus C.O.D. postage. (Money Back Guarantee on all VIVIF'S.)

NAME.....

ADDRESS.....

CITY.....ZONE...STATE.....

SPECIAL OFFER ☐ **ONE OF EACH SIZE VIVIF LURES ALL FOR ONLY $4.95**

New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1037. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

AFRICAN VIOLET PLANTER of plastic features an automatic moisture system that takes some of the guesswork out of growing tropical violets. A permanently attached saucer shows how much water should be added. The water drains from the saucer to a block of absorbent material, then rises through an interior pot of peat moss holding the plant. An air space between the peat moss holder and the planter's outer walls forms a high humidity chamber.

Science News Letter, April 30, 1960

PAPER-PLATE HOLDER grips a paper plate securely so it is less likely to bend, tip, spill or blow away. The holder is made of wrought iron wire with brass handles. The picnic conveniences are sold in low-cost packages of four.

Science News Letter, April 30, 1960

BOTTLE BABY DOLL has her milk and drinks it too. Raise the doll's arm and she drinks her milk. Lower her arm and the milk drains back into her bottle through an ingenious tube system. The 10-inch doll is made of unbreakable plastic.

Science News Letter, April 30, 1960

FIRE-RETARDANT PERSONAL FILE, shown in the photograph, features an insulated aluminum liner to protect valuable papers. The metal exterior of the low cost box has a gray hammertone finish. The file takes standard manila folders.

Science News Letter, April 30, 1960

DIGITAL COMPUTER KIT, for high school students, contains patterned cardboard and instructions for making a simplified computer. In building the computer, using 36 straight pins, a student learns how the electronic "brains" used by engineers and scientists operate.

Science News Letter, April 30, 1960

CREDIT CARD ORGANIZER has transparent pockets that hold a dozen or more credit cards, and an individual pocket for a dining club's credit book. Available in two sizes, the pocket-secretary also has a note pad and compartment for bills.

Science News Letter, April 30, 1960

HUMAN SKULL, a low-priced educational aid, is an anatomically accurate, life-size model made of bone-color plastic. Removal of the cap of the skull permits study of its interior, and a spring-action lower jaw simulates lifelike movement. A model of the brain fits into the cranial cavity.

Science News Letter, April 30, 1960

TRASH AND BAG HOLDER replaces the ordinary indoor trash basket with a frame for a large grocery bag. Trash can be placed in the bag, and trash and bag thrown out together. The sides of the holder have racks for storing various-sized grocery bags. The holder is made of aluminized wire with rubber tipped legs to protect the floor.

Science News Letter, April 30, 1960

Nature Ramblings

By HORACE LOFTIN

APRIL SHOWERS will surely bring May flowers to the face of the land, as plants bursting with new growth in the warmth and moisture of spring come into blossom. Each flower will, in turn, produce the seeds to furnish the plants of another year.

But flowering is not restricted to springtime, by any means. Some hardy species peeped through the ice in late winter, coming into blossom and then disappearing for the balance of the year. A whole host of other plants such as the composites (daisies, chrysanthemums and the like) usually wait for summer or even autumn for their peak of flowering.

A great number of plants will never come into flower at all! These are the algae, fungi, mosses, ferns, conifers and others whose life cycle does not include the reproductive structures we call the flower.

The conifers, such as pine and cedar, also

Spring Without Blossoms

produce flowers. This comes as a surprise to many people, and they would have difficulty saying when they might have seen a pine in bloom. The true flower is characterized by a fleshy ovary within which the fragile seeds develop. Pines and their kin, on the other hand, bear their seed relatively naked on the inner surface of a cone petal. There is no ovary to surround and protect it.

In all the plant kingdom, from one-celled algae to the great Sequoia, only two major groups possess seeds. These are the plants that produce true flowers (angiosperms), and those whose seeds are "naked," (gymnosperms). The gymnosperms include the conifers and several lesser known types such as the sago "palm" and the gingko (maidenhair tree). The angiosperms include the vast majority of plants familiar to us, ranging from lawn grass to orchids and petunias to oaks.

In terms of evolution, the gymnosperms are older than the true flowering plants. Plants more primitive than the conifers and their relatives all require water in some form in which the motile sperm must swim to reach and fertilize the egg. The gymnosperms, though, developed pollen, a means by which the sperm could be transported to the egg by air currents. This freed these plants from dependence on water for reproduction. The rise of flowering plants occurred later—in a sense awaiting the development of insects on which they largely depend for pollination. The flowering plants now make up most vegetation.

Science News Letter, April 30, 1960